# AUCKLAND REGIONAL LANDFILL

# LANDFILL MANAGEMENT PLAN

# Site Emergency Management Plan

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**CONTENTS**

LMP Section 3.91

# 1. INTRODUCTION

## 1.1 Scope of SEMP

This section of the LMP includes:

- responses to emergencies that could harm the environment
- emergency preparedness
- spill response plan

The site may also hold a separate standalone SEMP in grab-and-run format that also includes:

- responses to health and safety emergencies

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# 2. SITE INFORMATION

## 2.1 Site Contacts

ADDRESS: 1160 State Highway 1, Wayby Valley (aka Dome Valley)

TELEPHONE: ####

REGIONAL / BRANCH MANAGER: ####

TELEPHONE: ####

SITE SUPERVISOR: ####

TELEPHONE: ####

Area Wardens

Bin exchange area: #### Phone ####

Administration area: #### Phone ####

Mechanical workshop area: #### Phone ####

Renewable energy centre area: #### Phone ####

Site and landfill area: #### Phone ####

Emergency Controller

Landfill Operations Manager: ####

## 2.2 Emergency Services

In an emergency

FIRE, POLICE, AMBULANCE dial 111

Liaison

FIRE AND EMERGENCY NZ: ####

AMBULANCE SERVICES: ####

POLICE: ####

MEDICAL CENTRE: ####

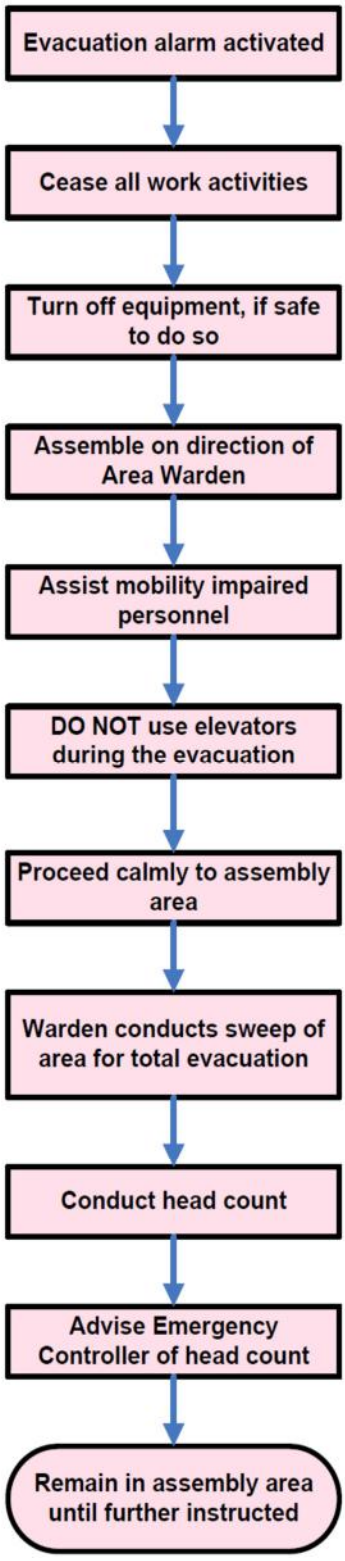
## 2.3 Neighbours

Separate list with private contact details held by site management.

# 3. SITE EVACUATION PLAN

## 3.1 Site Evacuation

### 3.1.1 Flowchart



### 3.1.2 Procedure

It is important to note the three stages of evacuation:

- Remove from immediate danger;
- Remove to a safe area;
- Full evacuation of the building and area.

As well as the stages of evacuation, the following is a guideline on the order of evacuation:

1 Personnel who are able to walk;
2 Personnel who are able to walk with assistance;
3 Personnel who are unable to walk.

### 3.1.3 Mobility issues

Persons suffering from mobility impairment or other impairment that would impact on their safe evacuation have an obligation to communicate the nature of the impairment to their Area Warden prior to any event that may require their evacuation.

The evacuation of persons with mobility impairments is the responsibility of the nominated Area Warden. The Area Warden shall:

- Obtain details, names and location, of any person who are permanent occupants of their area;
- Determine a pre-arranged evacuation point and guide the mobility impaired person to this area; and,
- If possible, assign a person to assist the mobility impaired person in an emergency.

In the event of an emergency evacuation and the evacuation path consists of obstructions such as stairways, for mobility impaired persons:

- They shall be guided to the pre-arranged evacuation point, e.g. landing in the fire stairs, or a wet space such as a bathroom;
- Ensure that another person remains with the mobility impaired person, if safe to do so, until further assistance is provided;
- The Emergency Controller shall be advised of the location of the person; and,
- The Emergency Controller shall arrange priority evacuation with the Emergency Services.

## 3.2 Site Evacuation Drills

Evacuation drills shall be arranged by the Emergency Controller, at a frequency of not less than two (2) per year. They should be conducted when full staffing is on site, wherever practicable.

All occupants of the floor(s) or area(s) involved in the evacuation exercises shall take part unless the Emergency Controller granted an exemption prior to conducting the exercise.

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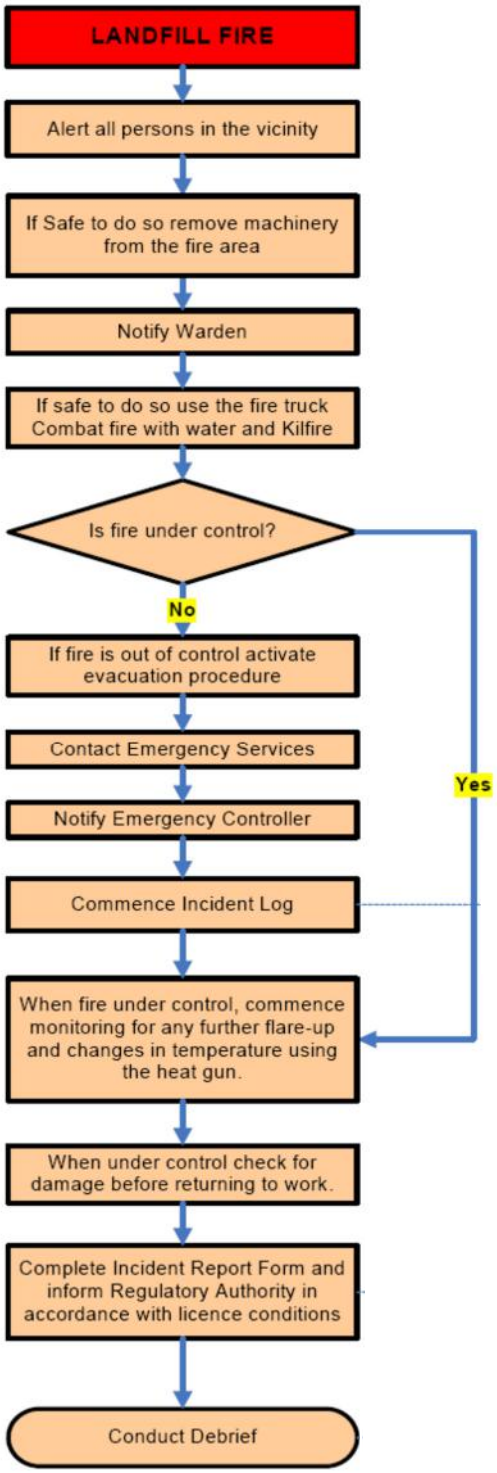
At the earliest practicable time after the evacuation exercise, the Emergency Controller, Area Wardens and other nominated personnel shall attend a debriefing session to be chaired by the Emergency Controller.

The main purpose of debriefing is to identify and correct any deficiencies in the procedure or its implementation. All areas identified for improvement shall be documented on HSEQ Emergency Drill Debriefing form.

# 4. EMERGENCY EVENTS

## 4.1 Fire - Landfill

### 4.1.1 Response Flowchart



### 4.1.2 Response - fire on landfill surface

1 If the fire appears too large to handle, call the fire service straight away.
2 Assume fumes are toxic. Stay out of the path of wind-blown smoke.
3 Put on protective gear if appropriate.
4 Identify the load or area on fire if possible. Warn others by site radio and call for assistance.
5 Use fire extinguishers if appropriate. Fire extinguishers are in the spotter's hut and WM vehicles.
6 Also, if necessary, use the water cart to spray water on the seat of the fire.
7 Also, if necessary, spread daily cover soil over the burning area to smother the fire.
8 Use machines to push nearby loose, flammable rubbish etc. out of the way if this can be done safely.
9 If these methods are unsuccessful, call for assistance from the Fire Service, dial 111.
10 Exhume the burnt refuse in small sections.
11 Spray water on any fire which re-appears using the water cart, or if appropriate fire extinguishers. Fire-fighting reserve water can be quickly obtained from on-site hydrants and ponds.
12 Call for back-up fire extinguishers to be made ready.
13 Reconstruct the refuse cell to proper thickness with daily cover.
14 If a deeper landfill fire is apparent, design and implement a strategy to eliminate air entry to the refuse around the area of the fire which may include:
- Foam cover (NZ Fire Service)
- Isolate nearest gas extraction wells (WM)
- Drill injection wells for water or inert gas
- Check and seal leachate cleanout risers (WM)
- Inject water or inert gas into the waste

15 Arrange for fire extinguishers to be refilled.
16 Report fires to the Auckland Council.
17 Inform neighbours.

### 4.1.3 Response - fire below landfill surface

1 If the fire appears too large to handle, call the fire brigade straight away.
2 Assume fumes are toxic. Stay out of the path of wind-blown smoke.
3 Warn others by site radio and call for assistance.
4 Move vehicles away so that they don't fall into collapsing refuse
5 Put on protective gear as required.
6 Use machines to push nearby loose, flammable rubbish etc. out of the way if this can be done safely.
7 Identify the load or area on fire if possible by visual inspection.
8 Monitor all surrounding gas wells for carbon monoxide and temperature.
9 Inspect the landfill surface and determine sources of air entry.
10 Use fire extinguishers and water on likely points of air entry.
11 Shut down the gas extraction system in wells showing elevated CO and temperature.
12 Reduce the vacuum in adjacent wells.
13 Call for back-up fire extinguishers to be made ready.
14 Wherever fire breaks out at the surface, spread cover soil and spray water to smother the fire using the water cart. Fire-fighting reserve water can be quickly obtained from ******

15 If these methods are unsuccessful, call for assistance from the Fire Service, dial 1 for a line out, and then dial 111.
16 Design and implement a strategy to eliminate air entry to the refuse around the area of the fire which may include:
- Foam cover (NZ Fire Service)
- Isolate nearest gas extraction wells (WM)
- Drill injection wells Check and seal leachate cleanout risers (WM)
- Inject inert gas e.g. liquid

17 Repair identified points of air entry.
18 Reconstruct the refuse cell to proper thickness with daily cover.
19 Arrange for fire extinguishers to be refilled.
20 Reintroduce gas extraction gradually over 3 days while monitoring the gas composition.
21 Report fires to the Auckland Council.

### 4.1.4 Response - fire from well, pipe or ground

1 Turn off gas supply or crush burning pipe, only if it safe to do so.
2 Turn off all nearby machines and motor vehicles. Turn off diesel machines.
3 Raise the alarm. Notify the Landfill Operations Manager.
4 Advise the gas team.
5 Call the Fire Service, dial 1 for a line out, and then dial 111.
6 Clear the area of people.
7 Test air quality - gas team to use their own testing equipment.
8 Trained firemen are to enter the area only with full respiratory equipment to assess the cause.
9 Call the Police if neighbours could be affected. Evacuate down-wind if appropriate.
10 Perform repairs. Safety is paramount.
11 Do not enter the area. The Fire Service is to be in control.
12 Report fires to the Auckland Council.

### 4.1.5 Clean-up

- Reinstate soil cover
- Test stormwater
- Replant vegetation
- Reinstate and commission damaged infrastructure

### 4.1.6 Emergency preparedness

- Waste compaction
- Minimised working face
- Daily cover
- Well-head monitoring for fire indicators

## 4.2 Fire - Wild Fire or Forest Fire

### 4.2.1 Response

1 Only suppress a fire if it is safe to do so and you're confident you can contain it.
2 Phone 111 immediately. Large fires were once small fires. Giving clear situational information to Fire and Emergency's Communication Centers will mean the right fire resources are dispatched – helicopters, fire equipment and heavy machinery.
3 Clearly state your address, road name & RAPID number, approximate area burnt, what's burning, what's at risk, wind direction and strength etc.
4 Once you have provided this information, you may wish to:
5 Advise neighbours, if they're likely to be affected.
6 Move livestock that may be affected by fire or smoke.
7 Take precautions to care for or avoid wildlife escaping the fire.
8 Wait at the road gate to give further information to fire fighters.

### 4.2.2 Clean-up

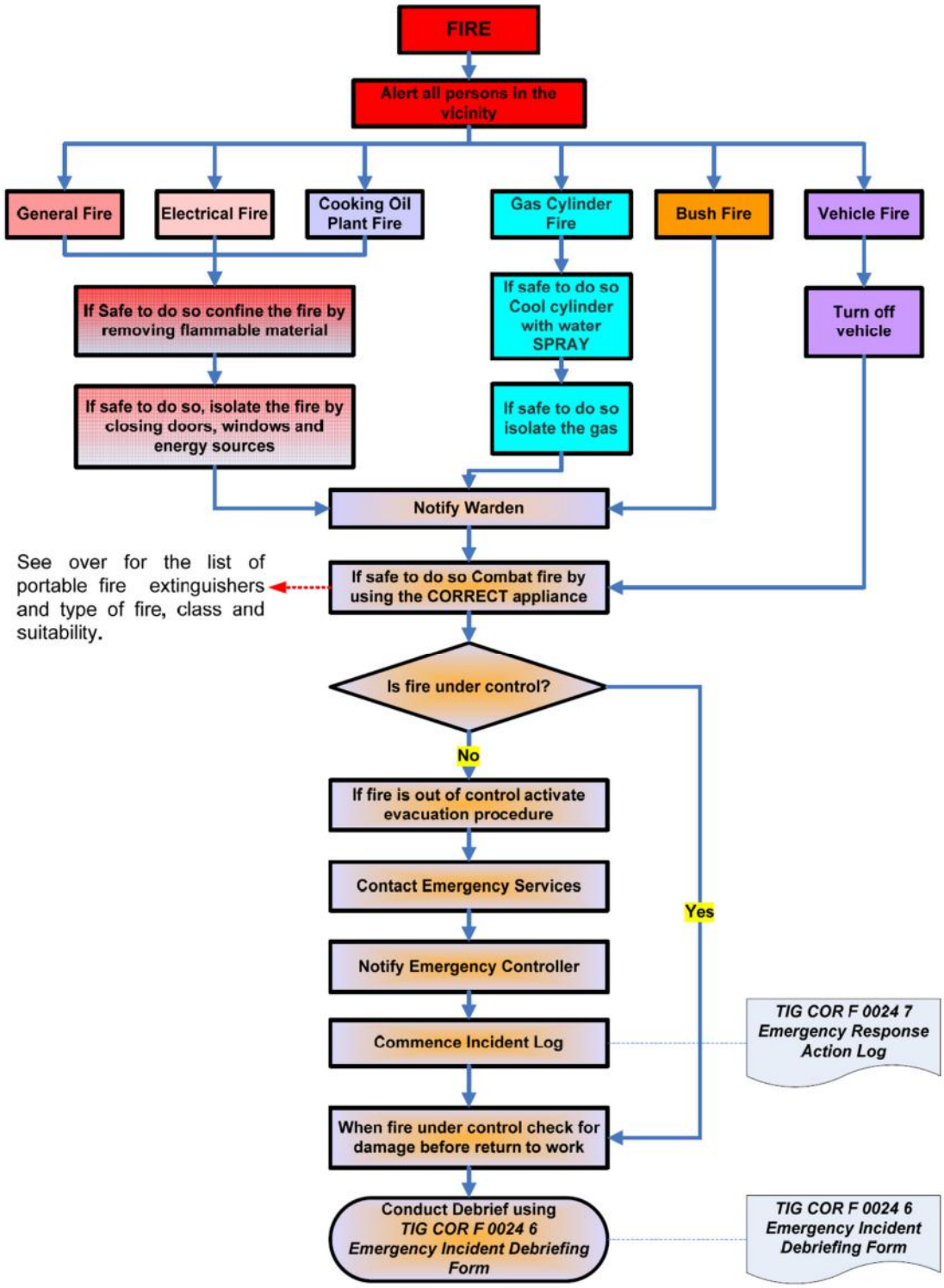
- Install interim erosion protection
- Engage with bird and fauna rescue services
- Replant vegetation

### 4.2.3 Emergency preparedness

- Liaison with forestry manager
- Accessible ponds for water supply
- Reticulated site water supply with elevated water storage tanks
- Hydrants connect to water tanks
- Periodic flow testing
- Routine clearance of flammable vegetation on open ground
- Truck and machine exhaust spark filters
- Route selection aim to avoid contact between machines and vegetation
- Fire hazard level signs at landfill entrance and entry points to forest

## 4.3 Fire - Buildings

### 4.3.1 Response Flowchart



### 4.3.2 Response

Buildings and vegetation:

1 Alert all staff on the site R.T. Sound the fire alarm.
2 Call the Fire Service, dial 1 for a line out, and then dial 111.
3 If an automatic alarm sounds, call the Fire Service, then check for smoke and fire to ensure that there is no malfunction.
4 Call the Landfill Operations Manager.
5 Unlock gates required for access to the fire.
6 Use extinguishers to fight fire if there is no apparent danger to personnel. Use the water cart, but not on electrical and inflammable liquid fires.
7 As necessary, switch off power.
8 Fire-fighting reserve water can be quickly obtained from *****
9 If time and safety permits, shut doors and windows and close fire-proof cabinets and file drawers.
10 Evacuate personnel from the area. Err on the side of caution.
11 Assemble at the emergency assembly point by the ******
12 If site evacuation is necessary, account for all staff.
13 Call the Fire Service again (dial 1 for a line out, then dial 111) if a false alarm occurs.
14 All fires must be reported to the Auckland Council as soon as possible.

### 4.3.3 Clean-up

- Move fire-damaged materials into the landfill
- Check for hazardous building materials
- Review design and operation of the damaged building

### 4.3.4 Emergency preparedness - Fire extinguishers

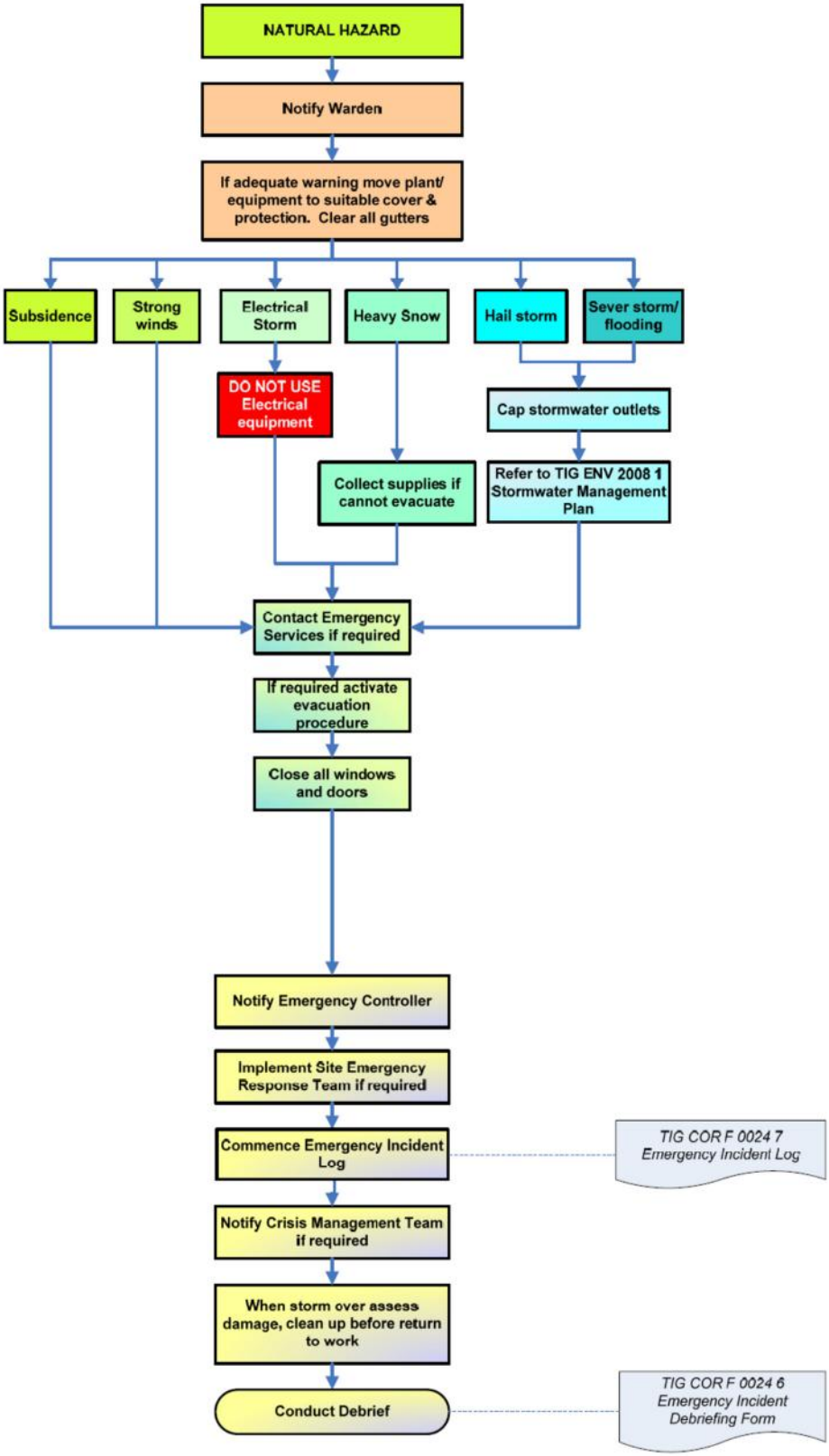
Fire extinguishers will be located at locations indicated in Appendix 3:

- Site office reception
- Operators amenities
- Gatehouse
- Workshop
- Renewable Energy Centre
- Spotters hut on working face
- All WM vehicles and machines

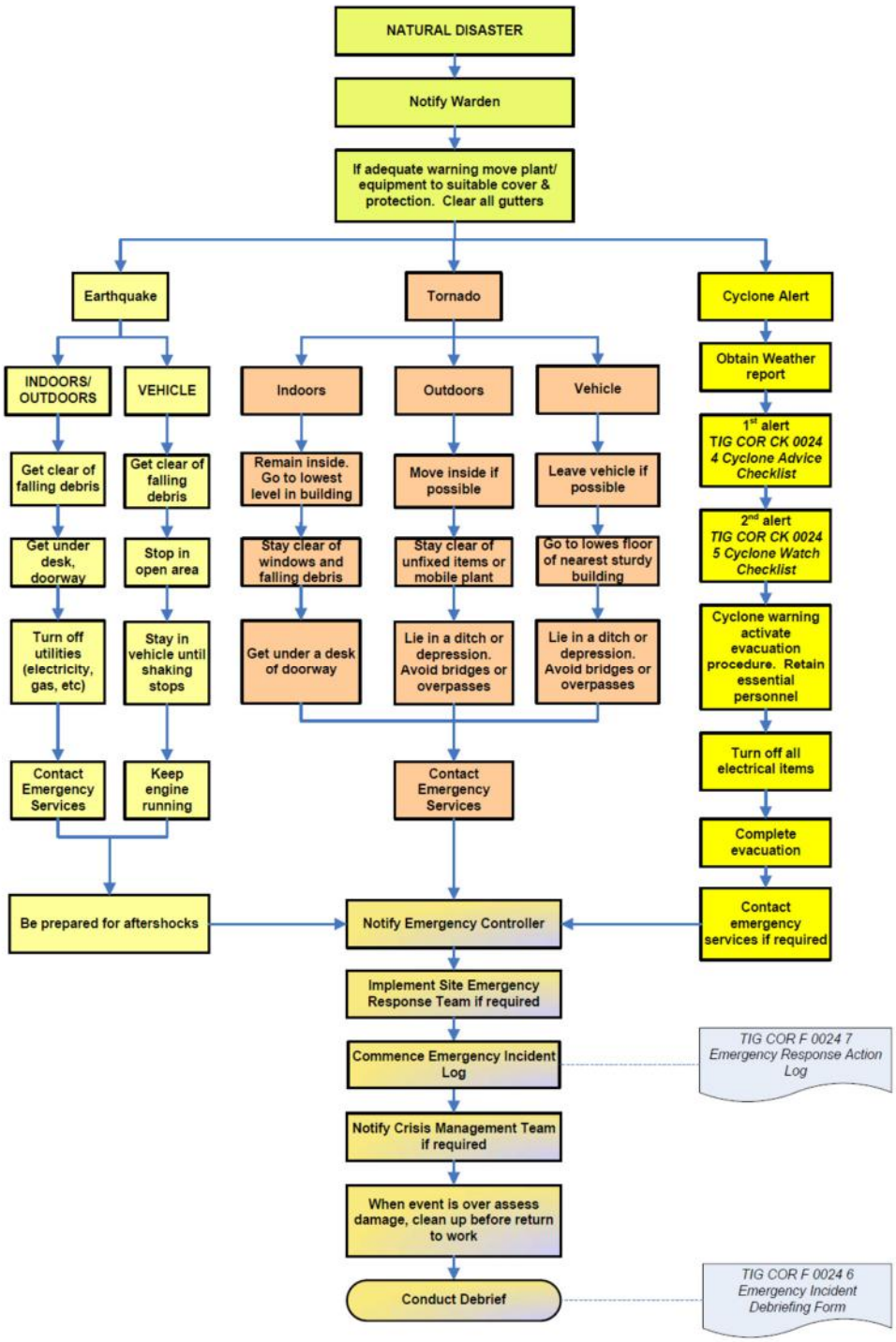
The fire extinguisher types will be assigned according to location and risk in consultation with fire experts.

## 4.4 Natural hazards - General

### 4.4.1 Natural hazard: flowchart



### 4.4.2 Natural disaster: flowchart



## 4.5 Flooding

### 4.5.1 Response

The main threats from flood are inundation of the waste, overwhelming of sedimentation ponds, cutting off access along SH1, vegetation debris washing downstream, blocked culvert on the access road, and strong flows under the Waiteraire Stream bridge.

Before an impending flood:

1. Move machines and diesel tanks to high ground.
2. Switch off electric power to low-lying appliances.
3. Empty the sedimentation ponds of any water at less than TL2 level to make space to attenuate the impending stormwater flows.
4. Check all flow paths including open drains, ponds and culvert inlets.
5. Secure any instruments at the ponds.
6. Confirm availability of pumps.

### 4.5.2 Clean-up

1. Inspect the landfill for instability and leachate leakage.
2. Isolate water which could be contaminated.
3. Inspect the site for breaches of ponds and channels.
4. Make repairs (temporary if necessary) to ponds and channels.
5. Check the condition of road bridges.
6. Clear debris around bridges and culvert inlets especially on the access road.
7. Advise the gatehouse as soon as normal operations can resume.

### 4.5.3 Emergency preparedness

- Sign-posts at flood risk locations on WM landholdings
- Clear access routes to and from ponds and major waterways
- Design of bridges and culverts with capacity to avoid damage from flood flows
- Design of ponds and water pathways to accommodate extreme events

## 4.6 Earthquake

### 4.6.1 Response

1. If inside a building, stay inside the building.
2. Take cover in an internal doorway or under a desk.
3. Stay away from windows and glass.
4. Do not use telephones.
5. Do not light a cigarette or fire.
6. If outside, move away from buildings, power lines, poles and trees.
7. Stop and park machines, trucks and vehicles for a minimum of 5 minutes. Repeat during aftershocks.
8. Afterwards, account for all personnel.
9. Administer First Aid wherever needed.
10. Refer to emergency procedure for sudden power failure if supply has failed (including turn off appliances and tow a gen-set to the site office).
11. Call the Landfill Operations Manager.
12. Identify the place and person to act as the Command Centre.

13. Do not admit any refuse hauliers to the landfill until clearance has been given by the Landfill Engineer.
14. Inspect the following for safety – access road, bridges, weighbridge office, site offices, power lines, gas flare station, flare stack, generators and workshop.
15. Measure for gas around buildings and the gas flare station. Use a meter or hire in equipment.
16. Inspect the following for environmental security – landfill slopes, leachate pipes, sedimentation ponds. There may be landslips/landslides or broken gas pipes.
17. Notify the Command Centre as each area is inspected and cleared. Walkover of the landfill and inspection of the quarry.
18. Cease operations in any area where damage is found.
19. Take steps to prevent damage getting worse.
20. Prevent contaminant escape from any damaged area. Take urgent steps to mitigate any material environmental effect.

### 4.6.2 Clean-up

21. Relocate the refuse operation where necessary and relocate refuse from damaged areas. Reinstate any damaged cover.
22. Repair any damage.
23. Report damage to the relevant authority.
24. Continue operations when advised by the Command Centre.

### 4.6.3 Emergency preparedness

- Geotechnical input into designs of buildings and slopes
- Staff education into what to do in an earthquake

## 4.7 Tornado/ cyclone/ extreme wind

### 4.7.1 Response

1. Move into and stay inside buildings and/or heavy vehicles, to avoid wind-blown debris. Do not run outside.
2. Stay away from windows and glass.
3. Do not use telephones.
4. Do not light a cigarette or fire.
5. Stop and park machines, trucks and vehicles.
6. Account for all personnel.
7. Administer First Aid wherever needed.
8. Refer to emergency procedure for sudden power outage if power supply has failed (including turn off appliances and tow a gen-set to the site office).
9. Call the Landfill Operations Manager.
10. Identify the place and person to act as the Command Centre.
11. Do not admit any refuse hauliers to the landfill until wind speed has dropped.

### 4.7.2 Clean-up

12. Inspect the following for safety – buildings, power lines, litter fences and screens.
13. Continue operations when advised by the Command Centre.
14. Report damage to the relevant authorities.

## 4.8 Landslip

### 4.8.1 Response

1. If inside a building when moving land has hit the building, stay inside. Take cover under a desk, table or other pieces of sturdy furniture.
2. If outdoors, try and get out of the path of the landslide or mudflow.
3. Run to the nearest high ground or cross-slope in a direction away from the landslide path.
4. If rocks and other debris are approaching, run for the nearest shelter such as a group of trees or a building or steep slope overhang.
5. If escape is not possible, curl into a ball and protect your head.
6. Stay away from the slide area. There may be danger of additional slides.
7. Check for injured and trapped persons near the slide area. Give First Aid if trained.
8. Remember to help your neighbours who may require special assistance – infants, elderly persons and people with disabilities.
9. Listen to a battery-operated radio for the latest emergency information.
10. Remember that flooding may occur after a mudflow or a landslide.

### 4.8.2 Clean-up

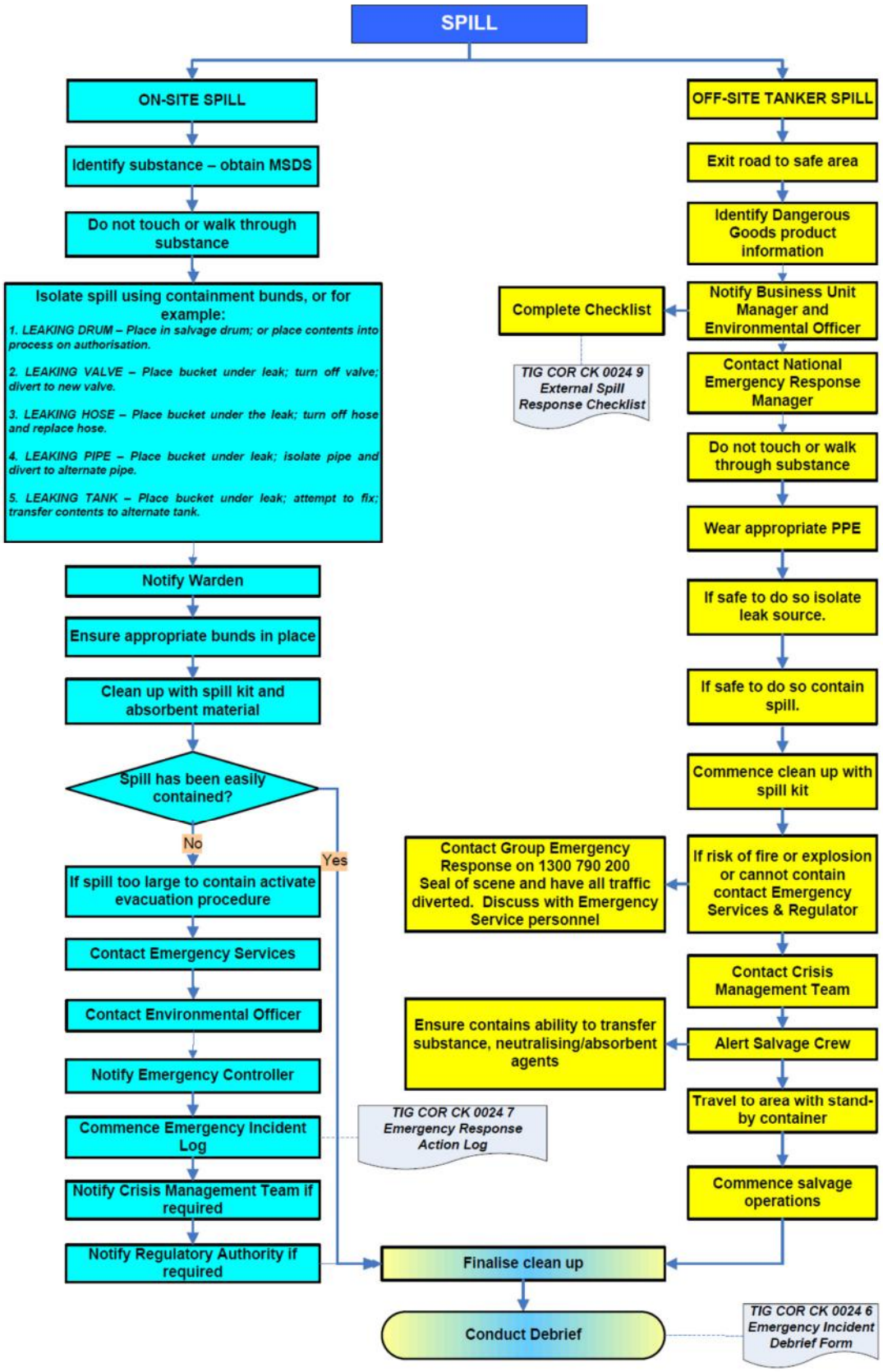
11. Check for damaged power lines. Report any damage to the power company. Check the water supply and gas lines. Report any damage to management.
12. Check building foundations and surrounding land for damage.
13. Replant damaged ground as soon as possible since erosion caused by loss of ground cover can lead to flash flooding.
14. Seek the advice of a geotechnical expert for evaluating landslide hazards or designing corrective techniques to reduce landslide risk.
15. Report damage.

# 5. SPILL RESPONSE PLAN

## 5.1 General

### 5.1.1 Response

*Flowchart*


SPILL
ON-SITE SPILL
Identify substance – obtain MSDS
Do not touch or walk through substance
Isolate spill using containment bunds, or for example:
1. LEAKING DRUM – Place in salvage drum; or place contents into process on authorisation.
2. LEAKING VALVE – Place bucket under leak; turn off valve; divert to new valve.
3. LEAKING HOSE – Place bucket under the leak; turn off hose and replace hose.
4. LEAKING PIPE – Place bucket under leak; isolate pipe and divert to alternate pipe.
5. LEAKING TANK – Place bucket under leak; attempt to fix; transfer contents to alternate tank.
Notify Warden
Ensure appropriate bunds in place
Clean up with spill kit and absorbent material
Spill has been easily contained?
No
Yes
If spill too large to contain activate evacuation procedure
Contact Emergency Services
Contact Environmental Officer
Notify Emergency Controller
Commence Emergency Incident Log
TIG COR CK 0024 7 Emergency Response Action Log
Notify Crisis Management Team if required
Notify Regulatory Authority if required
OFF-SITE TANKER SPILL
Exit road to safe area
Identify Dangerous Goods product information
Notify Business Unit Manager and Environmental Officer
Complete Checklist
TIG COR CK 0024 9 External Spill Response Checklist
Contact National Emergency Response Manager
Do not touch or walk through substance
Wear appropriate PPE
If safe to do so isolate leak source.
If safe to do so contain spill.
Commence clean up with spill kit
If risk of fire or explosion or cannot contain contact Emergency Services & Regulator
Contact Group Emergency Response on 1300 790 200 Seal of scene and have all traffic diverted. Discuss with Emergency Service personnel
Contact Crisis Management Team
Alert Salvage Crew
Ensure contains ability to transfer substance, neutralising/absorbent agents
Travel to area with stand-by container
Commence salvage operations
Finalise clean up
Conduct Debrief
TIG COR CK 0024 6 Emergency Incident Debrief Form

*Key steps*

1 Stop the source of the spill;
2 In all situations as a matter of priority, isolate the spilled substance using the appropriate spill containment equipment from appropriate spill kits;
3 If a person has come in contact with harmful liquid or powder or substance (e.g. deodoriser concentrate, motor coolant, de-greaser, fertiliser) then assist them to get to a shower and/or eye-wash;
4 Refer to the Material Safety Data Sheet (MSDS) for the substance to ensure that appropriate safety precautions are taken;
5 During the isolation and containment, wear appropriate personal protective equipment to handle the substance;
6 Ensure the scene has been secured especially if the spill is located close to sensitive receiving environments.

### 5.1.2 Clean-up

All spills will be cleaned up using the appropriate material such as a spill kit, absorbent rags, soil or sand.

If the spill involves non-hazardous material then the clean-up residual materials will be buried in the landfill.

If the spill involves a hazardous item or substance that does not meet the landfills' waste acceptance criteria, then the clean-up material and used absorbent products will be placed in empty drums. non-leaky containers or sealable bags and held is isolation awaiting removal to an appropriate off-site treatment facility. The MSDS will be placed with the clean-up material. An incident report will be recorded.

### 5.1.3 Emergency Preparedness

*Spill kits*

Spill kits will be clearly identifiable by signage. Access to spill kits will be unobstructed at all times.

A typical spill kit will contain:

- Oil absorbent pads
- Loose absorbent material
- 2 x Small booms
- Sand and sandbags to create a temporary bund
- Appropriate personal protective equipment
- A laminated copy of the spill response plan
- Spades (at appropriate locations)

Spill kits will be located at locations indicated in Appendix 2:

- energy centre
- bin exchange area
- workshop
- refueling area (if different from the workshop)

## 5.2 Leachate/condensate

### 5.2.1 Response

For a leachate spill on-site from a truck, fixed tank, hose or pipe:

1 Turn off leachate pump or valve.
2 Shower any person who contacted the spilled leachate.
3 Use site radio to advise relevant personnel on the site (including the Landfill Engineer).
4 Form bunds to contain the leachate and prevent it from entering the stormwater system.
5 Close all valves in surface water treatment system downstream of the spill.
6 Measure the conductivity of downstream waters.
7 Assess the area extent of the spill.
8 Clean up smaller spills with spill kits.
9 Cover the spill area with loose soil to soak up the leachate.
10 Repair any leaks and prevent further spillage.
11 Pump surplus fluid leachate back into the landfill through an open landfill gas extraction well or the active refuse placement face. Use a sucker truck if necessary.
12 Evacuate contaminated soil and dispose of at the active landfill face.
13 Dispose of used spill kit materials at the working face.
14 Pump water over any remaining traces of spilled leachate to dilute them before reaching the stormwater system
15 Notify the Auckland Council (09 377 3107) as soon as possible.

For leachate breakout from the landfill cover:

1 Isolate the area concerned by forming temporary bunds.
2 Dig a sump in the nearby refuse. Form a channel to feed the leachate to this sump.
3 Close all valves in surface water treatment system downstream of the spill.
4 Check the conductivity of downstream waters including the surface water treatment ponds.
5 Excavate the refuse at the leak.
6 Take any refuse which contains an excessive proportion of soil to the active landfill face.
7 Repair the leakage zone by compacting relatively permeable refuse (low soil content) back into the excavation. This should improve vertical downwards percolation of leachate within the refuse.
8 Reinstate the cover.
9 If leachate migrates off the landfill footprint the Auckland Council (09 377 3107) must be notified as soon as possible.

### 5.2.2 Emergency preparedness

- Leachate tanker filling station provided with spill kits and spill cut-offs.

## 5.3 Fuel/oil

### 5.3.1 Response

1 Ensure your own safety first, from fumes or ignition risk
2 Turn off the fuel source.

3 Turn off machines and any electrical devices. Extinguish cigarettes. Avoid ignition of the fuel.
4 Use site radio to notify the Landfill Operations Manager and nearby staff.
5 Form bunds to contain the spill. Stop the spill entering the stormwater system. Avoid contamination of water.
6 Close all valves in surface water treatment system downstream of the spill.
7 Cover the spilled fuel area with loose soil / dry mudstone / or sawdust from a spill absorbency wheelie bin to soak it up.
8 Make a mound out of the soil-fuel mixture with a stormwater drain around it.
9 Repair any leaks and prevent further spillage.
10 Excavate contaminated soil after it passes an ignition test. Weigh it at the weighbridge and after this load has been weighed in, dump it at the landfill face.
11 For spills occurring at storage tanks with a containment bund, excess fluid to be removed by a qualified contractor and sent for disposal off-site. Fuel/Oil interceptors to be checked and cleaned out if required.
12 If spilt fuel migrates off the landfill footprint the Auckland Council (09 377 3107) must be notified as soon as possible.

### 5.3.2 Emergency preparedness

- Spill kits - synthetic and sawdust
- Fuel tank bunds
- Oil and fuel interceptors on stormwater pipes
- Bund drain control procedures
- Fuel tank certification
- Handy site plans
- Relationship with sucker truck organisation
- Working alone procedures
- Sensible siting of fuel facilities

## 5.4 Sediment

### 5.4.1 Response

Heavily sediment-laden water could be released if a dam fails.

1 Use site radio to advise relevant personnel on the site (including the Landfill Engineer).
2 Form bunds if practicable to contain the stormwater from escaping into the stream.
3 Close all valves in surface water treatment systems downstream of the spill and at the pond site.
4 Measure the conductivity and turbidity of downstream waters.
5 Assess the area extent of the damage and obtain permission of any other land owners affected for access of survey.
6 Repair any leaks and prevent further spillage
7 Notify Auckland Council of the spill.
8 Develop a plan to both repair ponds and mitigate the contaminant discharge in surface waters in consultation with Auckland Council, appropriate WMNZ staff and consultants if they are engaged.

9 Continue to monitor the impact until such time as the contamination has been contained and removed.

### 5.4.2 Emergency preparedness

- Erosion and Sediment Control Plan inspection regime
- Access track maintained to the furthest downstream discharge point of the site
- Dam design professionally designed and in accordance with Council Guidelines

## 5.5 Log slash

### 5.5.1 Response

Log slash or debris could be washed downstream and accumulate at some locations.

1 Notify relevant site management personnel including Landfill Engineer if log slash accumulation is at a bridge pier.
2 Notify Auckland Council prior to any works in a stream.
3 Formulate a plan for removal of the debris. The plan should address access to the site for minimal additional disturbance e.g. ensure there is only one track in and out of the site.
4 All machines to be kept clear of bank edges or from entering the stream unless approved by Council.
5 Log jam removal activities should never be attempted alone, and a supervisor should be appointed to keep visual contact with everyone on the removal crew.
6 Material recovered from the stream must be removed from site and not placed on the bank edge.

### 5.5.2 Emergency preparedness

- Post-harvest log slash kept clear of waterways and flood zone
- Erosion and sediment control inspection programme to include an item for log clearing and removal
- Post-harvest inspections
- Riparian planting to remain as per NESP. Any damage resulting from slash damage and removal the Riparian margin will be rehabilitated

# 6. EMERGENCY RECOVERY

## 6.1 Emergency Conclusion

When the emergency is concluded and declared over by the Emergency Controller, subject to the type of emergency, the following may need to be conducted:

1. Secure all records, including the names of all employees involved, and documents - obtain legal representative's advice on record retention. Initial retention of these records shall be by the Branch Manager.

2. Clean up and store equipment - decide on what equipment should be added to supplies and/or replenished (e.g. fire extinguishers, spill kits) and equipment that was not available at the outset of the emergency.
3. Investigation - Ensure the scene has been properly secured from all traffic, personnel, etc., which could damage evidence or otherwise hinder an investigation.

No employee is authorised to provide a statement to any Regulatory Authority investigator unless they are represented by a member of the Company Legal Team.

## 6.2 Debriefing

In all emergency situations and within eight (8) hours of the emergency being declared over, employees directly involved in the emergency will attend a debriefing session coordinated by the Emergency Controller.

The aim of the debriefing shall cover, but not be limited to, the following points:

- Ensure all immediate requirements and concerns have been met;
- General information sharing;
- An outline of the recovery process for which roles and responsibilities may be allotted;
- Improvement to be made to the SEMP;
- Emergency response training;
- Notification process;
- Decision making process; and,
- Assessment of how employees would have responded if the emergency had escalated.
- Assignment of preventative and precautionary actions to the relevant responsible staff members.

## 6.3 Recovery

Recovery of damaged plant, equipment, buildings and land is the responsibility of the Branch Manager, Crisis Management Team, and relevant Managing Director. In the event that a building is damaged following a disaster, site management with assistance from engineering consultants as required will be contacted to assess the level of damage.

Prior to recommencement, it is vital to ensure:

- The scene of the emergency is completely clear of any danger;
- A proper investigation has been completed; and,
- An assessment of the Business Unit response to the emergency has been completed.

Site Management will make contact with the Company Insurance Broker as soon as possible to arrange for an insurance assessor to assess the extent of the damage.

Preferred contractors will be requested to assess damage and submit a quote for restoration.

### 6.4 Effects on Employees

During a disaster, people face severe emotional and physical distress, expressed in strong emotional and physical reactions. These are quite natural and normal responses to an abnormal situation.

Site Management will mobilise assistance (details are provided outside the scope of this environmental site emergency management plan).

## 7. TASK LISTS

### 7.1 Responsibilities

Fire Warden

- Respond in the event of fire in the warden's designated part of the site
- Evacuate people to safety
- Communicate (with people in warden area, head warden, and emergency controller)
- Before and after: Maintain the appropriate level of training

Emergency Controller

- Establish a command centre
- Receive reports from fire wardens
- Liaise with emergency services
- Appoint advisors and delegate
- Before and after: Maintain the appropriate level of training

### 7.2 Tasks

| Role | Responsibility | Frequency |
|---|---|---|
| Fire Warden | Attend fire warden training. | Every 2 years |
| Emergency Controller | Attend emergency controller training. | Every 2 years |
| Landfill Operations Manager | Check for Emergency Preparedness according to the Site Emergency Management Plan. | Annually |
| Landfill Operations Manager | Ensure that staff are adequately trained in spill response according to the Site Emergency Management Plan. | Annually |
| Landfill Operations Manager | Check spill kits. | Annually |
| Landfill Operations Manager | Check fire extinguishers and confirm the routine attendance of the supplier for servicing. | Annually |

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# 8. APPENDICES

## 8.1 Site Plan - Landmarks for navigation

(interim plan – extract from AEE May 2019)

(1 page)

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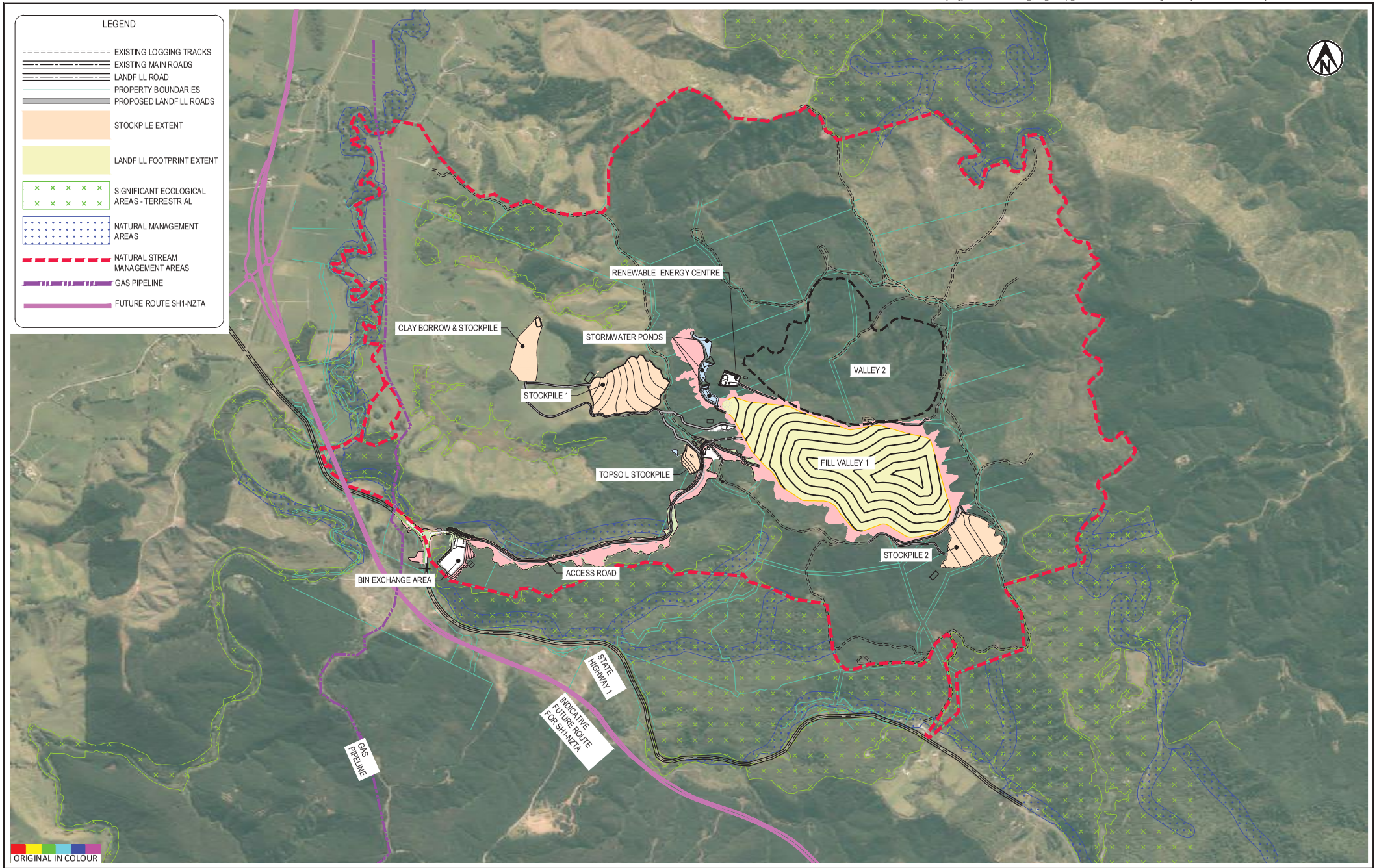


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SCALE 1:20,000

0 200 400 600 800 1000

Aerial photo sourced from Auckland Council GIS Website.

| | | |
|---|---|---|
| PROJECT No. | 1005069.1200 | |
| DESIGNED | RJB | May.19 |
| DRAWN | JABR | May.19 |
| CHECKED | ALB | May.19 |
| APPROVED | DATE | |

CLIENT **WASTE MANAGEMENT NZ LTD**

PROJECT **AUCKLAND REGIONAL LANDFILL**

TITLE ASSESSMENT OF ENVIRONMENTAL EFFECTS
Site Plan - WMNZ Landholdings

SCALE (A3) 1:20000 FIG No. Figure 4 REV 1

LMP Section 3.91

## 8.2 Site Plan - Spill kits

(interim plan – extract from S.92 response tranche 2)

(1 page)

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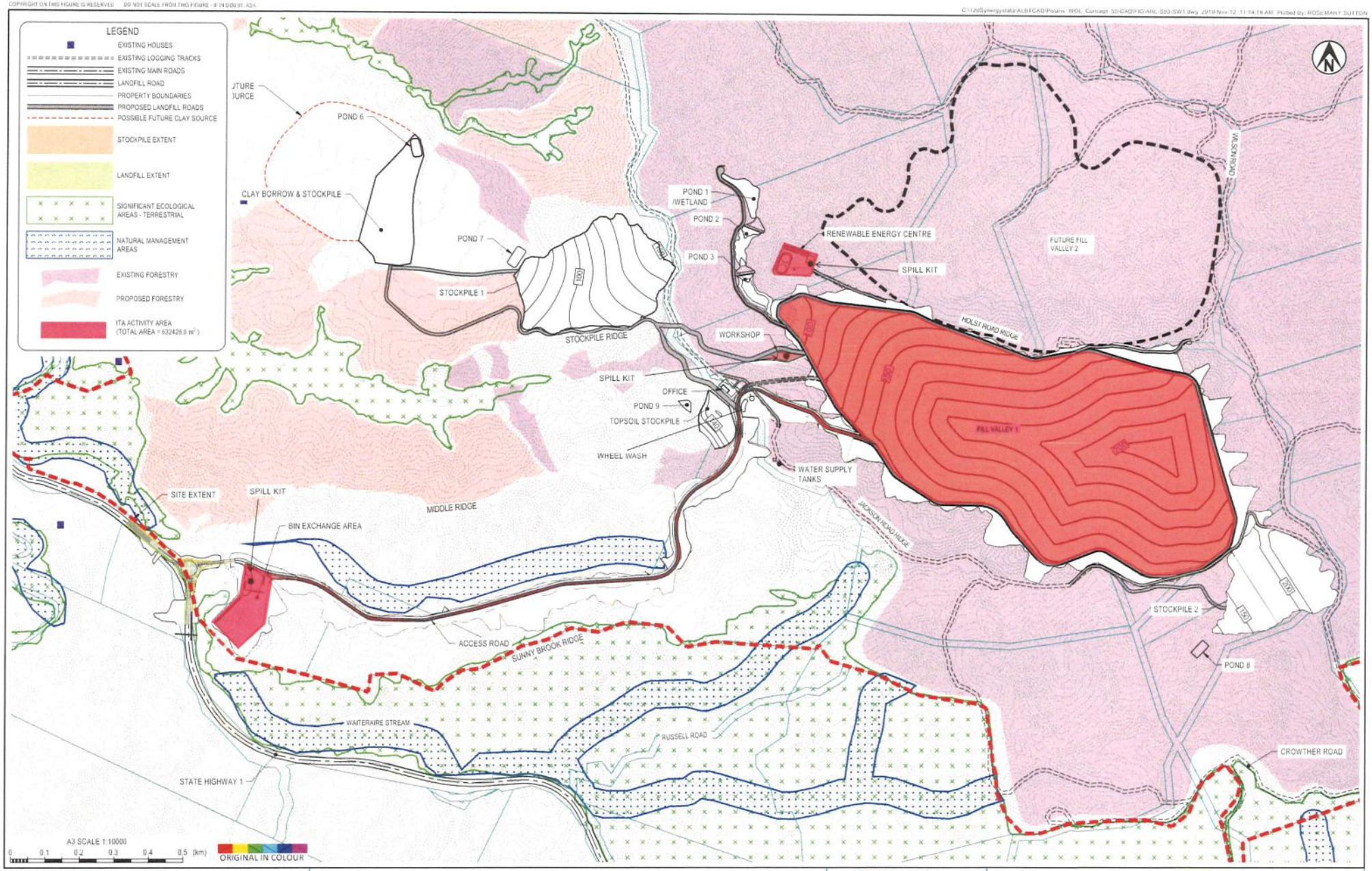


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| | | |
|---|---|---|
| PROJECT No. | 1005069 | |
| DESIGNED | RVDM | Nov.19 |
| DRAWN | rbs | Nov.19 |
| CHECKED | | |
| APPROVED | | DATE |

CLIENT **WASTE MANAGEMENT NZ LTD**

PROJECT **AUCKLAND REGIONAL LANDFILL**

TITLE SECTION 92
ITA ACTIVITY AREA PLAN

SCALE (A3) 1:10000 FIG No. SW-1 REV 1

LMP Section 3.91

## 8.3 Site Plan - Fire extinguishers

(to be added when buildings are built)

# AUCKLAND REGIONAL LANDFILL

# LANDFILL MANAGEMENT PLAN

# Landfill Gas Management Plan

**Document Control**

| Date | Status | Issued by | Issued to | Distribution method / upload site / link |
|---|---|---|---|---|
| 30/01/2020 | Draft d1 | BH | | |
| | | | | |

**CONTENTS**

LMP Section 3.42

# 1. INTRODUCTION

## 1.1 Scope of this section

This section describes

- landfill gas ('LFG' or 'gas') production
- risks and mitigations relating to landfill gas
- monitoring and contingency plans for landfill gas

# 2. LANDFILL GAS

## 2.1 Landfill gas composition

Landfill gas is naturally produced in landfills as organic waste materials decompose under anaerobic conditions. LFG typically comprises

- 50% to 60% Methane
- 35% to 50% Carbon Dioxide
- 0% to 2% Nitrogen, Oxygen, Hydrogen Sulphide, Non Methane Organic Compounds and other gases in trace amounts

LFG has a characteristic odour. LFG odour is distinctly different from the odour of incoming waste.

## 2.2 Landfill gas risks

Table …

| **Risk** | **Mitigation** |
|---|---|
| Landfill gas (and odour) release into air from the waste, leading to effects on neighbours. | Design themes for 'containment' and 'collection' as follows.<br>Covering the waste with a layer of soil overnight every night (daily cover).<br>Covering the waste with final cap of soil promptly in any area that has been filled to final level.<br>Methods to aid the preservation of integrity of cover, especially to avoid erosion or land instability, as described in the LMP section on Cover.<br>Minimising the time when older waste is exposed where cover is being removed and new waste is being placed. |

| **Risk** | **Mitigation** |
|---|---|
| | Preferential placement of soil-like wastes around the edges of the waste mass to help contain gas in the waste.<br><br>Extraction of landfill gas from the waste by way of pre-installed collection wells and pipes.<br><br>Establishment of a buffer zone between the landfill and potentially affected persons including neighbours.<br><br>Waste placement in small phases and in small daily working faces to reduce the area of uncovered or uncapped waste.<br><br>Regular monitoring and adjustment at well heads to ensure optimal extraction. |
| Odour from incoming waste. | Fresh waste has different odours and gases. Mitigation is described in the sections of this LMP on odour and disposal. |
| Gas escape into air from collection pipes (headers), leading to effects on receptors and worker safety issues. | Maintaining suction on the gas collection system that runs from the gas well field to the treatment plant.<br><br>Adding redundancy into the header network by running a header loop around the landfill which provides two main routes for gas into the treatment plant. |
| Emissions of Methane which is a Greenhouse Gas leading to climate change. | Maximising containment and collection of landfill gas by the methods above. |
| Gas escape into the ground, leading to unsafe concentrations under buildings. | Modern landfill lining system that is a barrier against migration of landfill gas.<br><br>Buffer distance to any off-site receptor.<br><br>Monitoring around on-site buildings. |
| Explosion (Methane will combust in air). | Gas extraction monitored and controlled to minimise mixing with air until the landfill gas is fed into a burner or treatment plant.<br><br>Intrinsically safe electrical equipment. |
| Asphyxiation. | Safe work procedures that avoid places where gas may accumulate. |
| Inadvertent unsafe encounters with gas wells or sabotage. | Fenced site.<br><br>Brightly coloured well heads.<br><br>Fenced or below-ground well heads post-closure. |

## 2.3 Landfill gas collection

### 2.3.1 Gas wells

Landfill gas will be collected in gas wells that are installed within the waste. The gas wells will be a combination of horizontal and vertical collectors - an indicative design is shown in Appendix 2.

The wells will be constructed as the waste is being placed rather than by retro-fit drilling, because as-you-go installation leads to more certainty that the wells will have a good zone of influence and that gas will be captured at the earliest practical opportunity as the waste starts to decompose.

A special assembly with ports to connect instruments will be fitted on top of each well head:

- to attach a well number label
- to measure gas pressure in the well
- to measure gas pressure in a pitot tube from which gas flow rate is determined
- to measure gas temperature
- to measure available vacuum
- to adjust the gas flow rate
- to measure the concentrations of constituent gases

Figure: Landfill gas well head

### 2.3.2 Balanced extraction

Vacuum in the landfill will be applied by one or more blowers which will be sized to supply sufficient vacuum and gas flow rate extending throughout the whole landfill waste mass.

Landfill gas suction pressures will be balanced to maximise extraction but to avoid sucking in Oxygen which might cause spontaneous combustion in the waste.

### 2.3.3 Priority principle

Whatever gas is collected will be treated. The priority will be to fully extract the right amount of gas for environmental reasons relating to the waste (avoidance of odour and fugitive gas emissions).

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The gas extraction flow rate will not be dictated by whatever treatment plant is currently running or its capacity. This means that the gas treatment plant has to include a destruction device such as a flare which can be turned up or down daily.

Landfill gas will never be 'stored' in the waste, since the waste has voids for only a few hours capacity after which any gas backlog would lead to odour emissions.

## 2.4 Landfill gas treatment

Collected landfill gas will be carried by headers to the treatment plant.

Treatment will be either by destruction in a flare aka thermal oxidation or by utilisation for power generation or other technology. When power generation or other technology is used, it will be expected to have similar destruction efficiency to flaring.

Whenever a flare is installed, it will meet the specifications required by the NES and any additional consent conditions.

# 3. MONITORING

## 3.1 Monitoring parameters and schedule

### 3.1.1 Purpose of LFG and air monitoring

- to determine the quantity and quality of recovered LFG;
- to estimate LFG collection efficiency and fugitive emissions;
- to raise an alert if unsatisfactory conditions occur e.g. indications of landfill fire, odour potential, or leaks in gas pipes;
- to measure end-product air discharges from treatment plants including flares and generators;
- to correlate meteorological conditions with monitoring results and any air quality complaint;
- to verify safe working conditions in structures and confined spaces.

### 3.1.2 Parameters

Methane Methane is a primary component of LFG. The methane concentration is an indicator of decomposition processes, sub-surface migration, flammability hazard, greenhouse gas contribution and available energy.

Carbon Dioxide Carbon Dioxide is the other primary component of LFG. The carbon dioxide concentration is an indicator of waste decomposition processes and sub-surface migration of LFG although it can occur in the ground from non-landfill sources.

Oxygen Oxygen concentration is an indicator of displacement by other gases, consumption by decomposition, contribution to flammability hazard and air intrusion into the landfill.

Residual Nitrogen Residual Nitrogen is an indicator of aerobic decomposition in the landfill, and air infiltration into the landfill. Nitrogen makes up 80% of air, and is not altered by processes inside the landfill, and is therefore a measure of how much air is being drawn in to the landfill. Residual Nitrogen is self-calculated by gas analysers by calculating the balance of gas remaining in a sample of LFG after subtracting the concentrations of Oxygen, fresh Nitrogen (linked to Oxygen), Methane, water vapour (adjusted for temperature) and Carbon Dioxide.

Temperature Temperature is an indicator of bacterial activity. Excessive LFG temperature is a sign of a landfill fire.

Carbon Monoxide Carbon Monoxide is an indicator of incomplete combustion or landfill fire although it can rise as the waste transitions from aerobic to anaerobic decomposition.

Pressure The LFG pressure is a measure of the driving force behind sub-surface migration, emission to atmosphere through cover, and flow to the extraction system. A low pressure or vacuum is applied to gas collection pipes installed in the waste. At well heads, a venturi pressure may also be measured to determine the gas flow rate.

Barometric Pressure The barometric pressure trend (prior to LFG monitoring) may affect the flow rate of gas emissions. Higher atmospheric pressure causes less LFG emission.

Hydrogen Sulphide Hydrogen Sulphide in LFG is a measure of toxicity and odour potential of LFG. It can affect performance of LFG treatment plants including combustion engines.

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Trace Gases LFG might contain some gases which are toxic or odorous. They include volatile organic compounds (VOCs) and non-methane organic compounds (NMOCs). Analyses are generally performed by sending bag samples to specialist laboratories.

Odour Odour is measured by olfactometry. The odour concentration is a measure of odour potential of the substance sampled such as LFG and special waste.

Flow Rate Gas flow rate measurements are a measure of the energy source, and an indicator of collection efficiency or decomposition activity when compared with estimates of expected gas generation.

Odour Odour is an indicator of the standard of management of the two main possible odour sources i.e. from old waste (landfill gas) and from new waste (working face). Odour is assessed by methods described in the Odour Management Plan.

Meteorological parameters A climate station will be maintained to record wind speed, wind direction, barometric pressure and rainfall, all of which are relevant to the assessment of the performance of the landfill in terms of gas and leachate management.

### 3.1.3 Monitoring schedule

Table …

| Location / Event / Topic | Parameter | Frequency | TL1 | TL2 |
|---|---|---|---|---|
| Main flare or manifold raw gas | Non-Methane Organic Compounds | Annually | 3000 mg/m3 hexane equivalents 0°C | No limit. Monitored for information. |
| Main flare or manifold raw gas | Hydrogen Sulphide | Annually | 500 ppm | No limit. Monitored for information. |
| Main flare or manifold raw gas | Total gas flowrate | Continuous | No limit. Monitored for information. | No limit. Monitored for information. |
| Main flare or manifold raw gas | Temperature | Daily | 50 °C | 60 °C |
| Flare exhaust gas 'stack testing' | Temperature | Continuous | Below 760 °C | Below 750 °C |
| Treatment plant exhaust gas 'stack testing' | Gas composition (constituents to be analysed tba) | Every 5 years | tba | tba |
| Landfill gas perimeter probes | Methane | Monthly | 1.25% CH4 by volume (25% of LEL) | 5.0% CH4 by volume (100% of LEL) |
| Landfill gas perimeter probes | Carbon dioxide | Monthly | 5.0% CO2 by volume | No limit. Monitored for information. |
| Gas well head raw gas | Methane | Monthly | 60% | 70% |
| Gas well head raw gas | Residual nitrogen | Monthly | 15 %v/v | 20 %v/v |
| Gas well head raw gas | Temperature | Monthly | 50 °C | 60 °C |
| Gas well head raw gas | Carbon monoxide | Monthly | 100 ppm | 1000 ppm and rising for 4 consecutive months |
| Main flare or manifold | Carbon monoxide | Monthly | 100 ppm | 1000 ppm |
| Landfill surface emissions survey | Methane | Quarterly | 500 ppm (0.05%) methane by volume | 5000 ppm (0.5%) methane by volume if not repaired and retested within two weeks |
| Buildings and structures | Methane | Quarterly | 1.25% methane by volume (25% of LEL) | 5.0% methane by volume (100% of LEL) |
| Buildings and structures | Carbon dioxide | Quarterly | 5.0% CO2 by volume | No limit. Monitored for information. |
| Walk-over inspection | Findings | Weekly | Any adverse finding on an item in the procedure checklist. | Any observation judged to be in non-compliance with consent conditions. |

## 3.2 Monitoring procedures

Table …

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| Procedure | Key steps |
|---|---|
| Walk-over inspection<br><br>The aim of walk-over inspections is to observe the condition of the final cap, intermediate soil cover, gas installations and drainage system. It will involve a visit in person to all sectors of the landfill on a regular basis.<br><br>The inspection will aim to find evidence of:<br>• odour<br>• point source of gas escape<br>• point of air intrusion, or stormwater infiltration, such as a deep crack<br>• gas reticulation system malfunction (damage, leak or failure)<br>• leachate recirculation system malfunction<br>• condensate system malfunction<br>• vegetation distress due to gas or other cause<br>• leachate breakout<br>• erosion, inadequate surface drainage<br>• excessive settlement<br>• refuse exposed by insufficient cover or by cover instability | • Safety preparations (PPE, working alone protocol, notice of intentions, means of communication)<br>• Site plan marked to show grids and identifiable landmarks<br>• Method or device to record the areas visited and any observations in those areas<br>• Entry of findings into the landfill's incident response tracking system |
| Gas well monitoring<br><br>The aim of gas well head monitoring is to provide information to assess the performance of gas extraction, to adjust if necessary the well-head settings, and overall to optimise gas extraction. It involves connection of a specialist landfill gas monitoring device to a well head, taking measurements which are datalogged, and making any immediate adjustments. | • Safety preparations (PPE, working alone protocol, notice of intentions, means of communication)<br>• Site plan marked to show gas wells and identifiable landmarks<br>• Portable device or instrument to record parameters and to datalog readings<br>• Device or record of previous readings<br>• On-the-spot adjustment if any key parameter is outside its proper range<br>• Logging of required maintenance<br>• Downloading of results same-day to where it will get supervisor attention |
| Perimeter gas migration well monitoring<br><br>The aim of sub-surface monitoring of gas in peripheral wells is to detect any combustible gas that might have found its way into the ground. It involves monitoring of gas probes i.e. vertical drilled boreholes located around the landfill just off the footprint. | • Safety preparations (PPE, working alone protocol, notice of intentions, means of communication)<br>• Site plan marked to show perimeter gas wells and identifiable landmarks<br>• Portable device or instrument to record parameters and to datalog readings<br>• Logging of required maintenance |

| Procedure | Key steps |
|---|---|
| | • Downloading of results same day to where it will get supervisor attention |
| Surface emissions monitoring (SEM)<br><br>The aim of SEM is to detect 'fugitive' gas emissions from the landfill cover and cap which might not be detected by other methods such as walk-over inspections. The procedure involves walking across the landfill surface following a 30 m grid pattern, and using a portable gas detector (with flame ionisation technology of similar which can measure instantaneously to an accuracy of approximately 50 ppm of Methane). Air and any gas close to the ground surface will be sucked into the meter by a hand-held hollow wand held with its end just above the ground surface. | • Safety preparations (PPE, working alone protocol, notice of intentions, means of communication)<br>• Portable instrument<br>• Calibration confirmation<br>• Site plan marked to show 30 m grids and identifiable landmarks including gas wells<br>• Record of Methane readings by datalogging<br>• GPS tracker (optional)<br>• Downloading of results same-day to where it will get supervisor attention<br>• Logging of required maintenance into the landfill's incident response tracking system |
| Gas at the renewable energy plant - portable instruments<br><br>The aim of gas measurements at the gas treatment plant is to provide basic information for the efficient operation of the flare, to enable comparison between actual and predicted gas generation rates, and to collect data for ETS reporting. A combination of fixed and portable meters may be used, and readings may be datalogged for future reference and calculations. | • Safety preparations (PPE, working alone protocol, notice of intentions, means of communication)<br>• Portable instrument calibration status check<br>• Confirmation of understanding of relevance (to ETS, combustion efficiency, safe atmosphere)<br>• Pre-start confirmation that automatic recording systems are working<br>• Pre-start check on ambient or room gas concentrations versus alarm levels<br>• Portable instrument recording of readings by datalogging<br>• Method of recording observations like in-field meter readings to cross-check against automatically recorded readings<br>• Downloading of results same-day to where it will get supervisor attention<br>• Logging of required maintenance |
| Combustion exhaust<br><br>The aim of generator exhaust stack emission monitoring is to measure the amount of pollutant gases e.g. Oxides of Nitrogen and Sulphur, Particulate, and Carbon Monoxide, for the purposes of comparing results with estimates made for the consent applications and confirming combustion efficiency. It involves access to sampling ports on the exhaust near the point of | • Specialist procedures by the testing agency<br>• Compliance with site's health and safety procedures |

| Procedure | Key steps |
|---|---|
| discharge to enable 'stack testing' to be conducted. | |
| Structures and confined spaced monitoring<br>The aim of monitoring of structures overlying or adjacent to the waste disposal areas and the LFG collection system is to verify safe working conditions in buildings, etc, from the hazards posed by methane.<br>Monitoring of confined spaces will be performed on a per occurrence basis to assess the threat to workers before entering any confined space. | • Site plan<br>• Calibrated instrument<br>• Walk around<br>• Probe underneath |
| Climate recording<br>The aim of recording meteorology is to record parameters relevant to gas, odour and leachate generation, i.e. rainfall, wind speed, wind direction, barometric pressure, temperature, and to help assess air quality complaints downwind. | • Proprietary climate station design<br>• Suitable location<br>• Reliable power supply<br>• Datalogging<br>• Quick access to readings e.g. web-based |
| Response to complaints | • As described elsewhere in this LMP |

Also it is noted that the consent allows for the AC to enter the site at their discretion for inspections subject to the site's safety protocols.

## 3.3 Reporting

| Location / Event / Topic | Report to | Method | Frequency |
|---|---|---|---|
| Landfill gas monitoring log. | In-house reporting | In-house records. Kept for the operating life of the landfill. | Daily |
| Landfill gas monitoring log. | Auckland Council | Email or file transfer. | On request |
| Landfill gas monitoring summary. | Auckland Council | Email or file transfer. | Annually |
| Exceedance of a TL2 limit - landfill gas. | In-house reporting | In-house records. | As required |
| Exceedance of a TL2 limit - landfill gas. | Auckland Council | Email notification. | Within 2 days after |
| Odour complaint. | Community Liaison Group. | Summary table sent by email or file transfer. | Quarterly |
| Odour complaint. | Auckland Council | Email notification. | Within 1 day after |

# 4. CONTINGENCY

## 4.1 Trigger levels - explanation

### 4.1.1 Trigger levels

Upon completion of a monitoring event, the results will be checked against the pre-specified response limits.

If no response limit is exceeded, the monitoring event will be routinely reported for example in an annual report to the regulator.

If any response limit is exceeded, then action will be taken immediately as described in the Contingency Plan Flowchart. The response limits are set at two levels:

Trigger Level 1 (Lower response limit)

Exceedance of TL1 warns of potential adverse effects, warns of potential future non-compliance with the resource consent conditions, requires investigation and reporting, and might require remedial action.

Trigger Level 2 (Upper response limit)

Exceedance of TL2 is a firm indication that significant adverse effects and breaches of consent conditions either are already occurring, or could have occurred, or are about to occur. The upper limit is typically set at the limit specified in the resource consent, so exceedance of the upper limit typically indicates non-compliance. Exceedance of TL2 will require one or more of: urgent mitigative actions; notification of authorities; calling of a specialist adviser (a qualified person or consultancy with experience in environmental management); prompt instigation of investigations, and; remedies.

Specialist advisor

A specialist advisor is a qualified person or consultancy with experience in landfill gas.

### 4.1.2 Emergency

Extreme exceedance of TL2 might require reference to the site emergency management plan.

### 4.1.3 Flowchart

The procedure to be followed upon receipt of monitoring results is illustrated in Appendix 3.

## 4.2 Response guidelines

Table: …

| **Contingency triggering event** | **Response guidelines** |
|---|---|
| Odour | Possible urgent remedial and precautionary actions include:<br>• spray and / or cover odorous waste;<br>• repair obvious leaks in gas system;<br>• repair obvious deficiencies in the landfill cover;<br>• make adjustments at gas well heads.<br>Response times for reporting to AC: |

| **Contingency triggering event** | **Response guidelines** |
|---|---|
| | • Within 48 hours for TL2 exceedance, or 24 hours for a neighbour's complaint relating to gas and odour<br>• as soon as practical for significant discharge<br><br>Possible investigative actions include<br><br>• Verify the odour in person<br>• Follow the complaints procedures if a complaint has been received.<br>• Check wind speed, wind direction and barometric pressure;<br>• Check daily tipping operations;<br>• Check any odorous load history (type, age, number, disposal method, timing);<br>• Check daily, intermediate and final cover;<br>• Check gas systems and flare for proper operation.<br>• Check leachate evaporator unit for proper operation<br>• Check LFG generators for proper operation. |
| Surface emission of methane over intermediate or final cover | Possible urgent remedial and precautionary actions include:<br><br>• Repair cracks;<br>• Repair seal around well heads;<br>• Increase vacuum at individual wells.<br><br>Possible investigative actions include:<br><br>• Re-check instrument calibration and repeat measurements;<br>• Perform a local walkover inspection;<br>• Check nearby gas systems for $CH_4$, $CO_2$, $O_2$ and pressure.<br><br>Possible corrective actions include:<br><br>• Repair any cracks in the landfill cover;<br>• Adjust vacuum at individual wells;<br>• Repair the LFG collection system;<br>• Install additional gas extraction well or lateral. |
| Methane in structures and confined spaces. | Possible urgent remedial and precautionary actions include:<br><br>• Evacuate people from structure;<br>• Lockout electrical equipment and place signs to warn of the danger.<br>• Ventilate areas, leave doors and hatches and openings (windows) open.<br><br>Possible investigative actions include:<br><br>• Check wind speed, wind direction, barometric pressure patterns;<br>• Check nearby gas systems for $CH_4$, $CO_2$, $O_2$ and pressure.<br>• Determine gas ingress point(s). |

| **Contingency triggering event** | **Response guidelines** |
|---|---|
| | Possible corrective and preventative actions include:<br>• Improve LFG collection system;<br>• Excavate trenches and place cut-offs or vents;<br>• Increase gas collection in the landfill;<br>• Review the confined spaces list.<br>• Block off gas ingress point(s).<br>• Increase monitoring of structure or install permanent gas monitoring sensor if necessary. |
| Methane in perimeter probes | Possible investigative actions include:<br>• Check barometric pressure patterns;<br>• Check flares for $CH_4$, $CO_2$, $O_2$ and pressure;<br>• Review liner reports, geology and hydrogeology.<br>• Drill additional investigative probes;<br>• Analyse the gas to differentiate between landfill gas and other sub-surface gas e.g. from swamps, buried animals, and adjacent ancient landfills.<br>• Check that readings are repeatable, and check variation in water table levels in probes from historical levels.<br>• Determine if any near-by off-site structures are at risk by monitoring with FID instrument.<br>Possible corrective and preventative actions include:<br>• Improve LFG collection system;<br>• Excavate trenches, place cut-offs or vents or provide secondary gas extraction system.<br>• Increase gas collection in the landfill.<br>• Increase monitoring of structure or install permanent gas monitoring sensor if necessary. |
| Findings from weekly walk-over inspection. | Possible investigative actions include:<br>• Use portable gas meter to define extent of concern;<br>• Review design drawings of affected features.<br>• Check exposed pipeline for damage, leaking joints and note areas where gurgling can be heard (namely condensate is accumulating and interfering with gas flows). |
| Residual nitrogen, temperature, carbon monoxide in a gas well. | Possible investigative actions include:<br>• Perform a local walkover inspection, particularly noting any cracks in the landfill cover, damaged pipelines, all joints for leakage, damage at wellheads-both wellhead pipe works and breaks in the ground around the wellhead.<br>• Look for trends in gas quality that may indicate air intrusion; |

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| Contingency triggering event | Response guidelines |
|---|---|
| | • Check well pressures;<br>• Measure gas parameters at other wellheads in the vicinity.<br>• Check instruments for correct operation and that readings are repeatable.<br><br>Possible corrective and preventative actions include:<br><br>• Repair any cracks in the landfill cover;<br>• Reduce vacuum at individual wells;<br>• Repair LFG collection system;<br>• Temporarily close off affected wells. |
| Oxygen and methane concentration in gas entering gas treatment plant | Possible corrective actions include<br><br>• Adjust wells in wellfield<br>• Adjust burner settings to correct gas concentrations<br>• Adjust flows entering processes other than the flare e.g. electricity generators and leachate treatment plant |

# 5. TASK LISTS

## 5.1 Tasks and scheduled maintenance

Table …

| Role | Task | Frequency |
|---|---|---|
| Landfill Gas Manager | Track progress on resolution of TL exceedances relating to gas using the landfill's incident response tracking system (e.g. on cover repairs upon receipt of surface emissions monitoring results). | Weekly |
| Landfill Gas Manager | Review gas monitoring results and equipment condition reports, and as necessary arrange repairs and maintenance on the gas treatment plant, combustion systems, extraction network and well heads, etc, to ensure optimal collection and destruction efficiency and odour elimination. | Monthly |
| Gas Technician | Check all automated gas monitoring records. | Daily |
| Gas Technician | Install gas collection in the landfill to keep up with waste disposal. | Weekly |
| Gas Technician | Arrange or carry out repairs and maintenance on any gas well head, header, condensate sump or gas infrastructure logged as an alert during any monitoring. Keep a log maintenance (relating to gas).. | Monthly |
| Landfill Operations Manager | Arrange or carry out repairs and maintenance on any daily cover, intermediate cover or final cap logged as an alert during any monitoring. Keep a log of maintenance (relating to gas). | Monthly |
| Landfill Engineer | Compare actual landfill gas flow rate to prediction, and update the prediction for capacity planning purposes. | Annually |

# 6. APPENDICES

## 6.1 Site plan - gas wells

Drawing

(one page)

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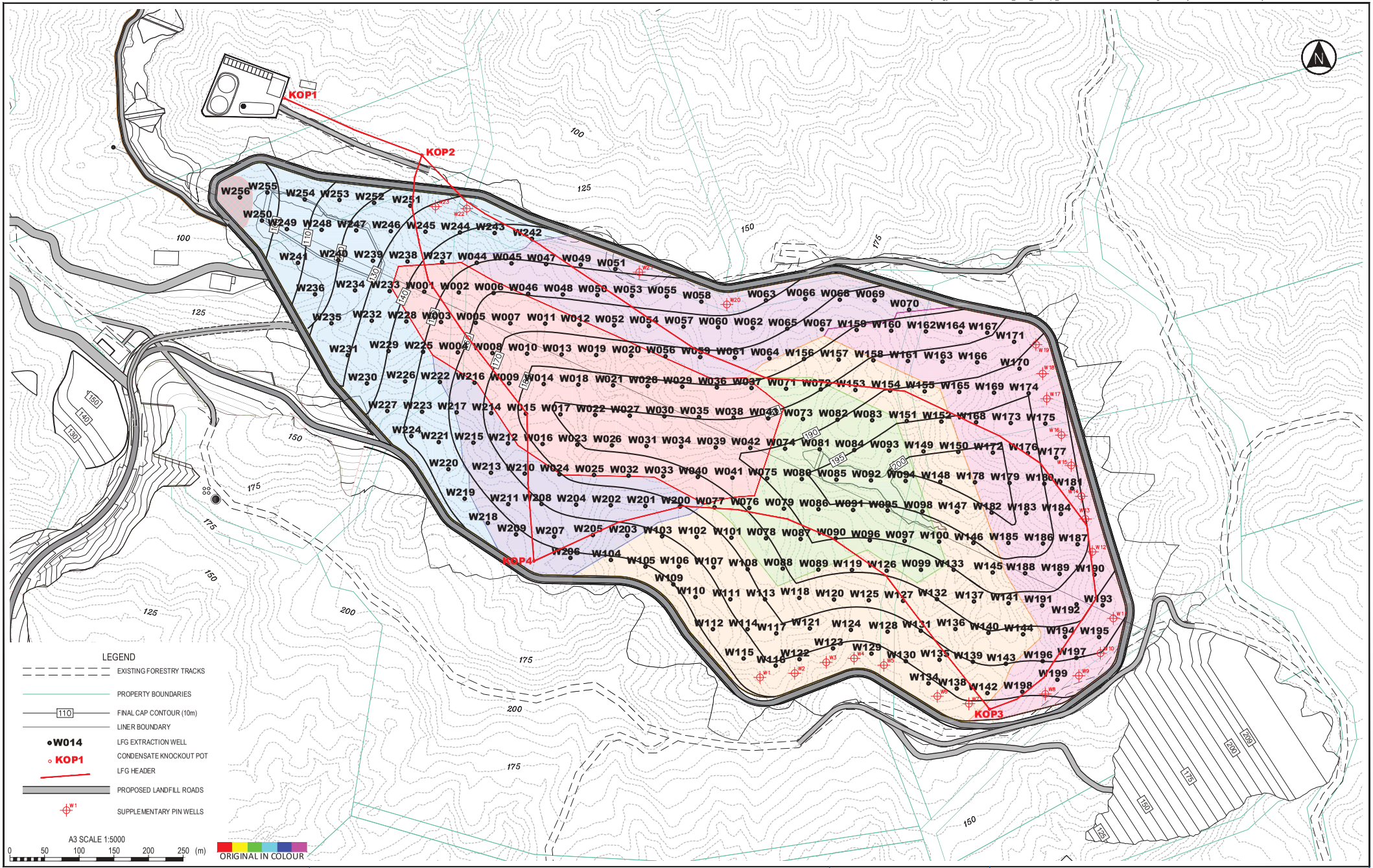
C:\12dSynergy\data\ALBTCAD\Polaris_WOL_Concept_55\CAD\FIG\Polaris-GM-ENG-60.dwg 2019-May-29 5:34:26 PM Plotted By: JUAN CARLOS ABREGO CASTILLO




NOTES:
1. LFG LAYOUT PROVIDED BY WMNZ.

| | | |
|---|---|---|
| PROJECT No. | 1005069 | |
| DESIGNED | AGBB | Jun.18 |
| DRAWN | TORY | Aug.18 |
| CHECKED | SFE | May.19 |
| | Simonne F Eldridge | May.19 |
| | APPROVED | DATE |

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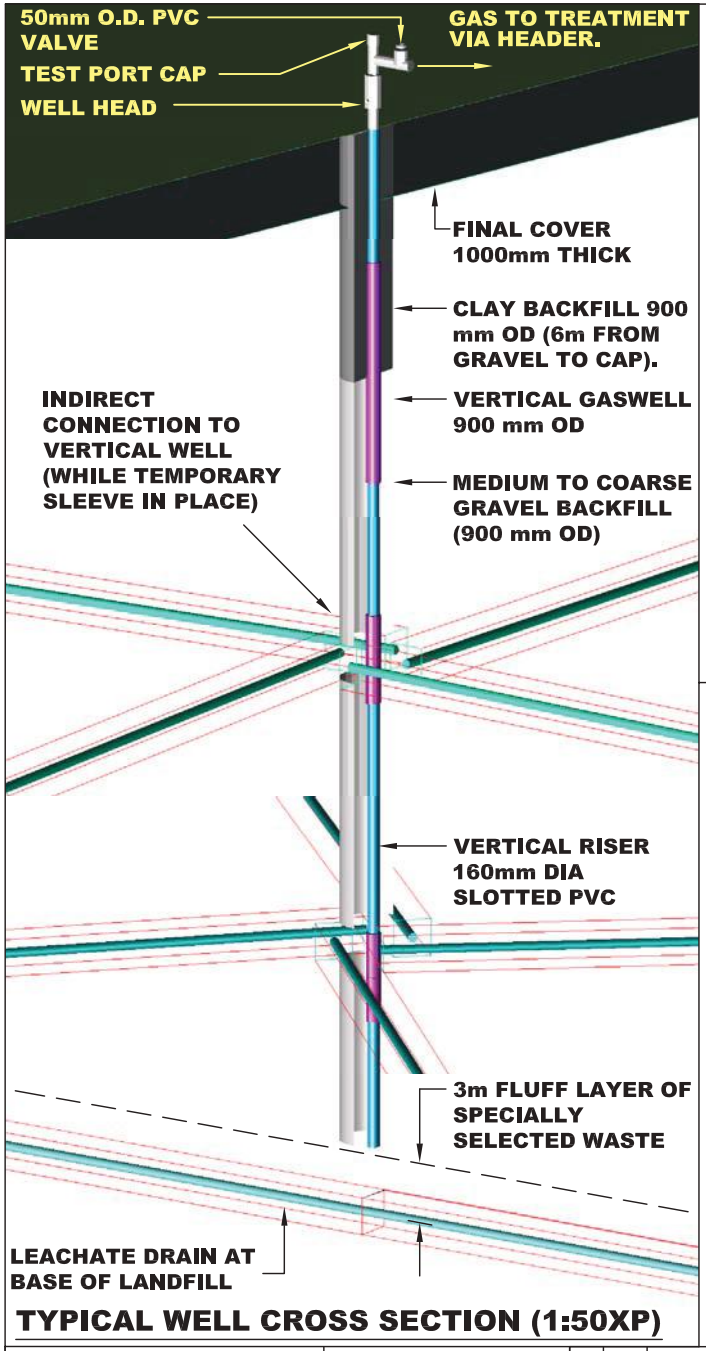
CLIENT WASTE MANAGEMENT NZ LTD
PROJECT AUCKLAND REGIONAL LANDFILL
TITLE LANDFILL
INDICATIVE LFG WELL LAYOUT PLAN
SCALE (A3) 1:5000 FIG No. ENG-60 REV 1

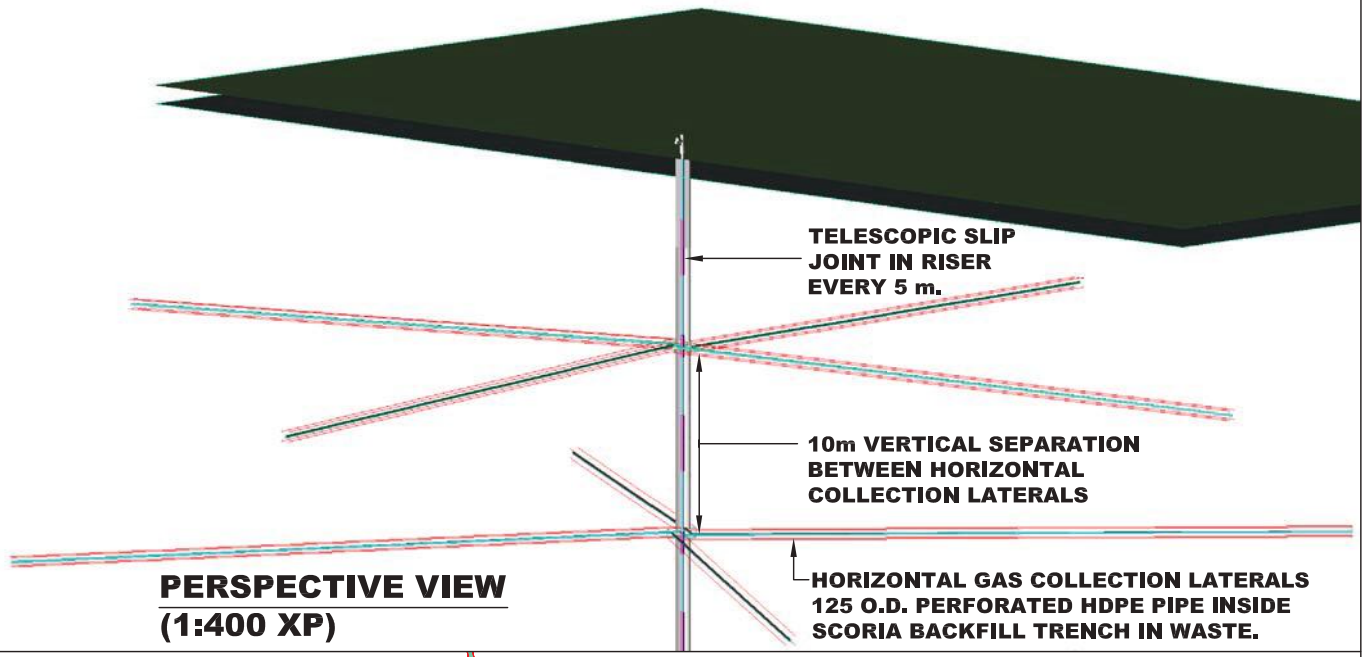
## 6.2 Gas well construction

Drawing

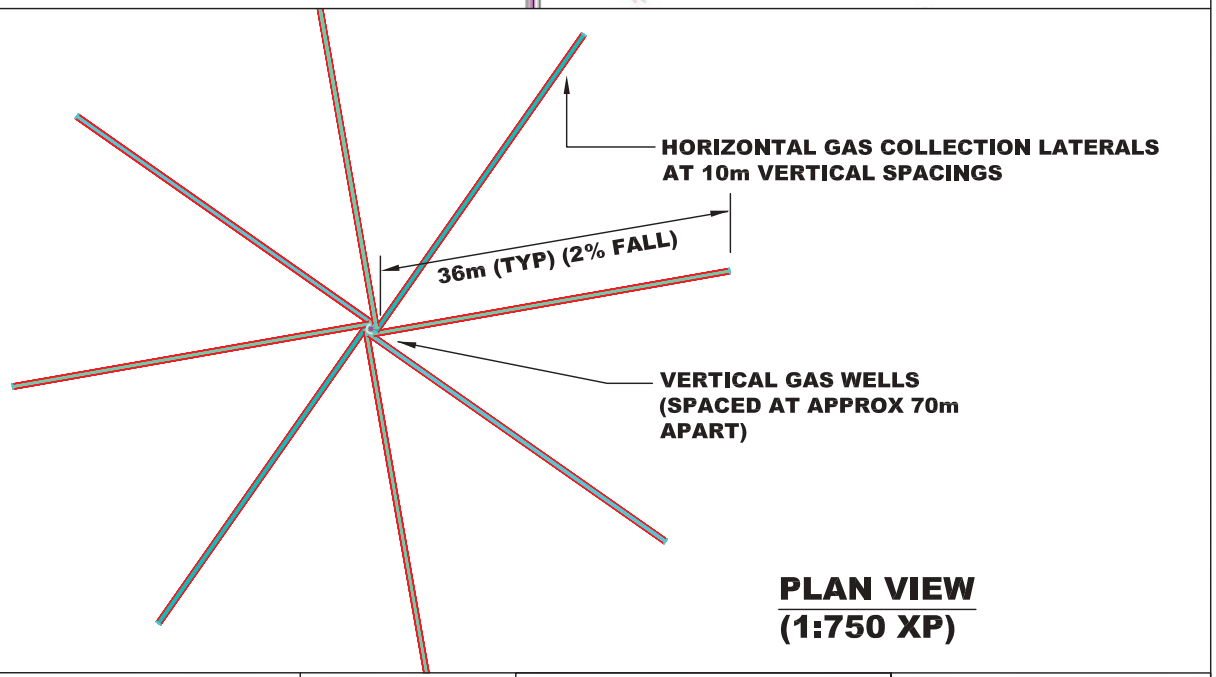
(one page)




## TYPICAL WELL CROSS SECTION (1:50XP)




## PERSPECTIVE VIEW (1:400 XP)




## PLAN VIEW (1:750 XP)

NOTES:

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| REV. | BY | DATE | DESCRIPTION OF CHANGE |
|---|---|---|---|
| C | NFS | 9–2004 | 45 DEG ALTERNATE LATERALS INTRODUCED |
| B | NFS | 11–2001 | LATERALS OFFSET |
| A | NFS | 6–2001 | 1ST ISSUE |

DESIGNER'S REF

CHECKED: JP 9–2004

APPROVED: BH 9–2004

DRAWN BY: NFS 9–2004

SCALE: AS SHOWN – A3

CAD FILE : FILL–GA–0207

PROJECT TITLE : WASTE MANAGEMENT

DRAWING TITLE : TYPICAL LFG EXTRACTION WELL CONSTRUCTION

Waste Management

FIGURE 41.3

SHEET NO FILL–GA–0207 REV: C

## 6.3 Contingency plan flowchart – landfill gas

(one page)

**AUCKLAND REGIONAL LANDFILL**

Contingency Plan Flowchart

Landfill Gas